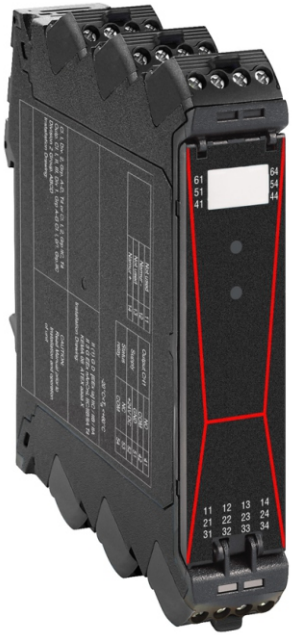
Operating Manual



DR-ADLM

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1 General

1.1 Information

- These operation instructions contain important information on handling the digital strain gauge amplifier. Working safely requires that all safety instructions and work instructions are observed .
- Skilled personnel must have carefully read and understood the operating instructions prior to beginning any work.
- The operating instructions are part of the product and must be kept in the immediate vicinity of the DR-ADLM and readily accessible to skilled personnel at any time.
- Observe the relevant local accident prevention regulations and general safety regulations for the DR-ADLM's range of use.
- If the serial number gets illegible (e. g. by mechanical damage), a retraceability of the instrument is no longer possible.
- The temperature sensors, described in this operating manual, are carefully designed and manufactered using state of-the-art technology. Every component undergoes strict quality inspection in all stages of manufacture.
- The manufacturer's liability is void in the case of any damage caused by using the product contrary to its intended use, non-compiliance with these operating instructions, unauthorised modifications to the DR-ADLM or assignment of insufficiently qualified skilled personnel.

1.2 Signs, Abbreviations

Warning!
A non-compliance can cause injuries to persons and/or the demolition of the device.
There can be a danger to life.

Attention!
A non-compliance can cause faulty device operation or lead to property damage.

Information!
A non-compliance can influence the device operation or cause unintentional device reactions.

Danger!
When the safety instructions are not complied with there is a risk of serious or fatal injuries caused by electrical power.

Warnung!
Avoid hot surfaces or liquids. Hot surfaces and liquids can cause dangerous situations to occur, e. g. burns.

2 Transport, Packaging, Storage

2.1 Transport

Check the instument for any damage that may have been caused during transportation. If, report them immediately.

2.2 Packaging

Do not remove packaging until just before mounting. Keep the packaging as it will provide optimum protection during transport (e.g. change in installation site, sending back).

2.3 Storage

For longer term storage avoid the following influences:

- Direct sunlight or proximity to hot objects
- Mechanical vibration, mechanical shock (putting it hard down)
- Soot, vapour, dust and corrosive gases

If possible store the device in ist original package or an equivalent one

3 Safety Instructions

Before installation, commissioning and operation ensure that the appropriate digital strain gauge amplifier has been selected in terms of measuring range, design, and setting.

More important safety instructions can be found in the individual chapters.

3.1 Intended Product Use

A strain gauge full bridge is connected to the DR-ADLM, which then amplifies the signal and puts it out as standard signal.

The DR-ADLM has been designed and built solely for the intended use described here and may only be used accordingly.

The technical specifications contained in these operating instructions must be observed. Improper handling or operation of the instrument outside of its technical specifications requires the instrument to be taken out of service immediately and an inspection by the manufacturer.

When the instrument is transported from a cold into a warm environment, the formation of condensation may result in the instrument malfunctioning. Before putting it back into operation, wait for the instument temperature and the room temperature to equalize.

The manufacturer shall not be liable for claims of any type based on operation contrary to the intended use.

3.2 Personnel Qualification

Risk of injury if qualification is insufficient

Improper handling can result in considerable injury and damage to equipment.

- The activities described in these operating instructions may only be carried out by skilled personnel who have the qualifications described below.
- Keep unqualified personnel away from hazardous areas.

For installation and start-up of the digital strain gauge amplifier, the personnel has to be familar with the relevant regulations and directives of the country and must have the qualification required. They must have knowledge of measurement and control technology, have to be acquainted with electric circuits, are capable of carrying out the work described and can indenpendently recognize potential hazards. Depending on the operation conditions of the application they need to have the corresponding knowledge, e.g. of corrosive media.

3.3 Special Hazards

For hazardous media such as oxygen, acetylene, flammable or toxic gases or liquids, refrigeration plants, compressors, etc., in addition to all standard regulations, the appropriate existing codes or regulations must also be followed.

If you do not comply with the appropriate regulation, serious injuries and/or damage can occur!

A protection from electrostatic discharge (ESD) is required.
The proper use of grounded work surfaces and personal wrist straps is required when working with exposed circuitry (PCB, printed circuit boards), in order to prevent static discharge from damaging sensitive electronic components.

There is a danger of death caused by electric current.
Upon contact with life parts, there is a direct danger of death.

Electrical instruments may only be installed and connected by skilled electrical personnel.

Operation using a defective power supply unit (e.g. short circuit from the mains voltage to the voltage output) can result in life-threatening voltages at the instrument.

Residual media in dismounted instruments can result in a risk to personnel, the environment and equipment. Take sufficient precautionary measures.

Do not use this instrument in safety or Emergency Stop devices. Incorrect use of the instrument can result in injury.

Should a failure occur, high temperatures may be present at the instrument.

4 Start-up, Operation

4.1 Function

The DR-ADLM is mounted on a standard rail in a switch cabinet. A load on the connected strain gauge sensor changes the output signal of the full bridge. This is converted into a standard electrical signal via the measuring amplifier of the DR-ADLM. This signal changes proportionally to the load on the sensor and can be further processed.

4.2 Before Mounting

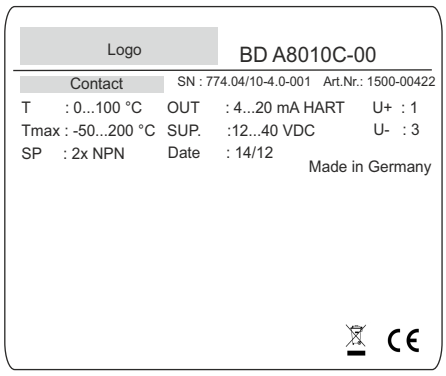
Check if the digital strain gauge amplifier is supplied completely.

Inspect the DR-ADLM for possible damage during transportation. Should there be any obvious damage, inform the transport company and supplier without delay.

Keep the packaging, as it offers optimal protection during transportation.

Make sure that the plug-in terminal strips are not lost and that the connection contacts are not damaged.

4.3 Product Label (Example)

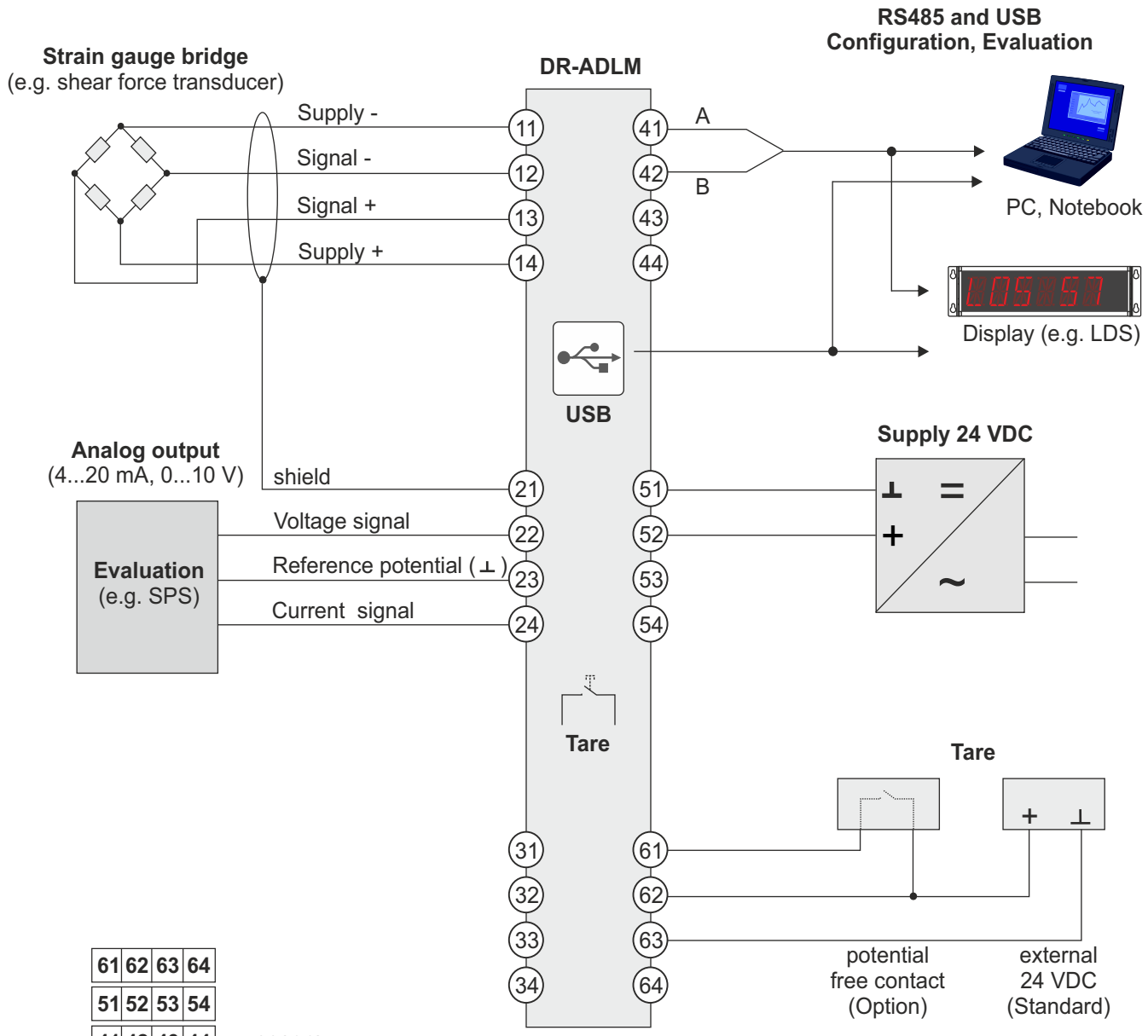


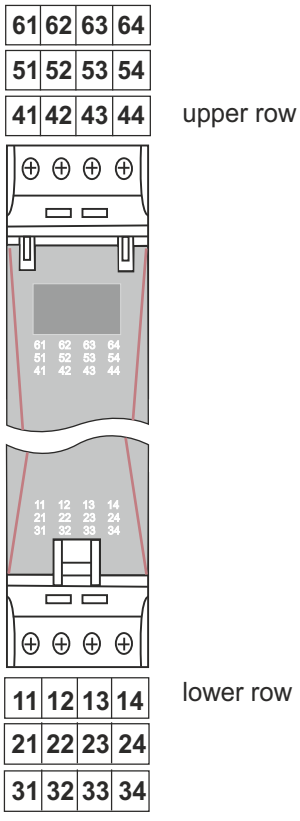
OH...	:	Product code	Art.Nr.	:	Part number
Tmax	:	Range maximum	SN	:	Serial number
T	:	Temperature range	Date	:	Date of QC
U+	:	Supply/Loop +	OUT	:	Loop signal
U-	:	Supply/Loop -	SUP.	:	Range of voltage
SP	:	No. and kind of switch point			

4.4 Mounting

Attach the rail housing to a 35 mm top hat DIN rail as per EN 60715 (TS 35) by simply snapping it on without any tools.

Dismounting is done by unlocking the locking element.





Please connect your devices like shown in the connection diagram above.

The diagram on the left shows the connection positions on the device.

Note:
The DR-ADLM measurement amplifier allows the connection of multiple evaluation devices to display measurement values, both over USB, RS485 or even using both interfaces simultaneously. Configuration however is only possible over one single connected device. Trying to configure the DR-ADLM via multiple devices will lead to a crash.

6.1 Device Connection

To start a device configuration or a data evaluation, please connect your DR-ADLM with a PC or notebook. Alternatively, you can connect a display, but this option is for data evaluation only: A device configuration is not possible! (See chapter 5 *Connection* for more information about connecting devices to the DR-ADLM.)

After connecting your device to the PC, you will need to establish a connection between your device and the programming software ADLM-MIE. You can find the software in our download-section on *www.mueller-ie.com*.

Additionally, you will need a device to simulate input for calibration. You can use either a simulator, or an actual input device, e. g. a load cell. Connect your input device to the DR-ADLM. If no physical simulator or input device is available, the integrated software simulator can be used instead.

Now, check both electrical connections and data connections for faults.

If all connections are faultless, go to the folder containing ADLM-MIE.

> **Note: If you are using a Windows OS and haven't changed the download location, you will find the program as a .zip-file in your standard download-folder.**

Please unpack the .zip-file now into your preferred folder.
The unpacked program is an executable and does not need an installation. Launch the program with a double-click. You should now see the user interface of the software. (See 6.2 *User Interface*)

Standard language of the software is German, but you can switch to English by selecting the tab *Einstellungen/Parameters*, selecting *Sprachauswahl/Select Language* from the drop down menu and choosing option *English.* The program will prompt you to restart. Please close the program and launch it again as normal.

Next, you need to ensure the software uses the correct com port. Use the option *Select Serial Interface* under the tab *Parameters* to select the correct com port.

> **Note: The connection through USB or RS485-adapter creates a virtual com port. When using a Windows OS, you can easily check the correct com port by opening the device manager and checking your com and LPT connections.** If you have multiple devices connected via com ports or are unsure which connection is the correct one, disconnect and reconnect your DR-ADLM while watching the device manager. The correct com port will disappear and reappear corresponding to your connection. Now set the correct com port in ADLM-MIE.

After the correct com port has been selected, you can now establish a data connection between the DR-ADLM and the programming software. Go to the tab *Process* and select *Connect module*.

ADLM-MIE will now momentarily show an Input/Output window while processing the command. The window will close automatically after the connection is established.

Under the tab *Process,* two new options are now available: *Disconnect module* to sever the connection, and *Read data from module*.

If you want to begin a configuration, select *Read data from module*. The software will now read the current parameters of your device and display them on the user interface.

To test the connection, simulate input by e. g. adding a weight to the load cell. The input should be displayed on the user interface under *Current values*.

6.1 Device Connection (Continued)

If the display shows wrong or no values, disconnect the DR-ADLM via *Disconnect module*, then reconnect as described on page 6 down.

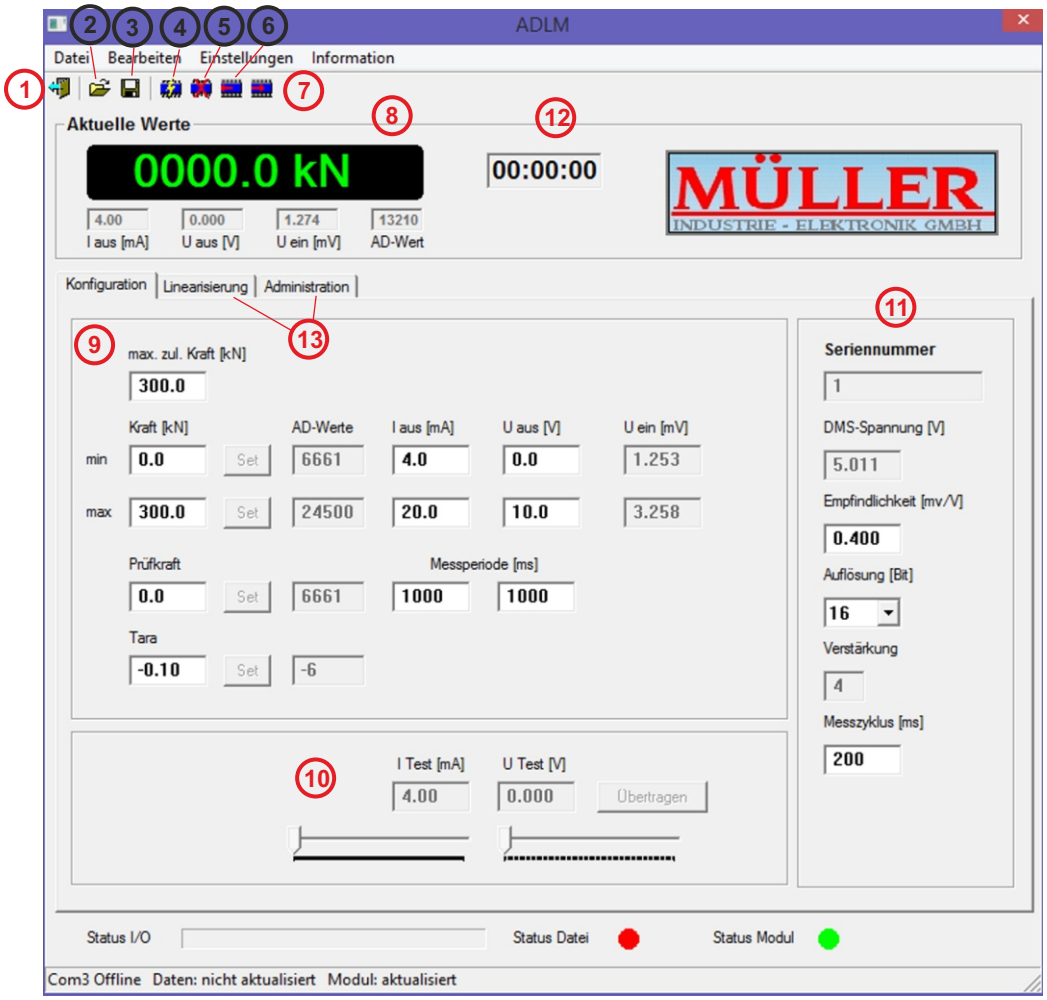
If the error remains, restart the program. If the error persists even after a restart, check the connections and the connected devices for faults. Check your simulator or if you are using a connected device (sensor, load cell), check the device or input-values.

If the display shows correct values, the device is now ready for configuration. See 6.3 *Device Configuration* for more information.

6.2 User Interface

Alternatively to controlling the user interface using tab commands, a user can also use buttons to interact directly with the user interface of the program.

Note: Some options are only available using the tab commands, while some commands or functions are only available using buttons. If not stated otherwise, this manual setzt assumes the user will mainly use tab commands to select commands.



1	End program	8	Display for current input values
2	Open configuration file	9	Main window, with Configuration tab
3	Save configuration file	10	Software simulator
4	Connect module	11	Device data for currently connected devive
5	Disconnect module	12	Local time
6	Read data from module	13	Tabs not used for configuration
7	Write data into module		

6.3 Device Configuration

Before starting the configuration of your DR-ADLM, please back up your configuration using the *Save file* button. If you later want to go back to an earlier state, you can use the *Open file* button to reset your settings.

Clicking on *Save file* generates a file containing your current settings. This file is located inside the same folder as your programming software. Clicking on *Open file* opens up this folder and allows you to open the backup file.

If your settings have been changed after saving your backup, you will be prompted to save your new settings. Select *No* to restore the old settings. Select *Yes* only if you are sure you do not want a reset! If you save over your old backup, a reset to the former state will become impossible!

If your settings and the backup settings are identical, ADLM-MIE will return an error message and close the program. Should this happen, you will have to restart the program and re-establish your device connection. (See chapter 6.1 *Device Connection*)

Calibration

The measurement range of the DR-ADLM corresponds to a voltage of 0…10 VDC or a current of 4…20 mA. To begin calibration, add a measurable input, e. g. a test weight for a connected load cell or use a simulator to simulate electrical values.

Ensure the programming software is displaying the correct values.

To set the zero point, click on the *Set*-button right next to *Kraft/Force* ***min*****.**

The zero point of the measurement range has now been adjusted to the new value. E. g. when using a test weight of 1 kg on a load cell, the DR-ADLM will now register 1 kg as zero point corresponding to 4 mA and 0 VDC.

If you are using electrical values directly (e. g. via simulator), the new zero point will be calculated using the current pre-set values. E. g. applying 5 VDC input will at factory settings (0…300 kN) create a new zero point at 150 kN. After changing the zero point, the new measurement range will be 0…150 kN corresponding to 0…10 VDC.

Next, set the maximum value of your chosen measurement range by applying your corresponding input or simulating your corresponding electrical values like described above. Click on *Set* right next to *Kraft/Force* ***max****.* to change to the new value.

You have now configured a new measurement range.

Note: For example, a new zero point of 150 kN and a new maximum of 250 kN will create a measurement range of 0…100 kN on the device.

To save your new configuration, select *Write data into module* from the tab *Process.*

6.3 Device Configuration (Continued)

Alternative calibration methods

Apart from using direct sensor input or simulated values to adjust your measurement range, you can alternatively edit the corresponding text windows of the programming software directly. However, this method is error prone and not recommended.

A third possible calibration method uses a sensor-input/simulated value, similar to the first method. Here however, after an input is applied, the *Checking force* will be set, which the DR-ADLM will then compensate for, creating a new zero point.

To save your changes, select *Write data into module* from the tab *Process.*

To test if your calibration was successful, disconnect the module and close the program. Restart the program, re-establish connection and select *Read from module* from the tab *Process* (Or click on the corresponding button). The programming software should now display your changes as the current configuration.

Save file will now create a backup using your changes as the new baseline.

Note: In case you want to go back to your old configuration at some later point, you should create a copy of your old backup file and move it to a different folder first.

If you accidentally write over your new configuration with a backup file or want to undo changes, use *Read from module*. Please be aware that this reset will only work if you haven‘t already saved your changes into the device with *Write data into module*!

7 *RS485*

Connection

Terminal 41: RS485 A Terminal 42: RS485 B

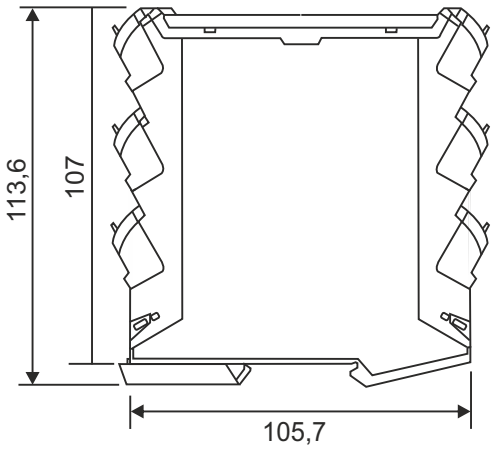
RS485 Parameters

Max. transmission rate:	9600 kbit
Max. receiver:	1 (config) / 32 (display)
Modbus:	is not used

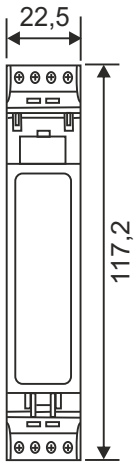
8 Technical Data

Input		
Strain gauge:	Amplifier:	up to 2 strain gauge full bridges 350 Ω (summation of signal)
	Sensitivity:	0,1...5 mV/V (programmable)
Standard signal:	Current:	0(4)...20 mA
Option:	Voltage:	0...10 V
Output		
Analog:	0...10 V and 4...20 mA (standard)	
Optionen:	0...10 V und 0...20 mA	
	2...10 V und 4...20 mA	
	2...10 V und 0...20 mA	
Current:	load <500 Ω	
Voltage:	load resistance 10 kΩ minimum	
Interface		
Interface 1:	RS485 (configuration and evaluation)	
Interface 2:	USB 2.0 (configuration and evaluation), under front cover	
	Type: Mini-B port	
Optional interface:	currently not available	
Accuracy		
Resolution:	12 /14 /15 /16 bit (programmable)	
at measuring rate:	128 / 32 / 16 / 8 per second	
Combined error:	± 0,2% of end scale value	
Temperature coefficient.:	<50 ppm/K	
Measuring rate:	10 ms....5 s (programmable)	
Filter:	10 ms...5 s (programmable)	
Power Supply		
Voltage:	24 VDC, ±20%	
Power consumption:	with options approx. 1,5 W	
Sensor supply:	5 VDC, 35 mA maximum	
Environmental Conditions		
Operating temperature:	-10...+60°C	
Storing temperature:	-20...+70°C	
Tare		
External function:	Active (drive with external 24 VDC)	
	Option: Passive (drive with potential free relay point)	
Internal function:	Key under front cover	
Mechanics		
Case DR 22,5:		
Dimensions:	117,2x22,5x113,6 mm	
Material:	PA66 GF30	
Color:	black	
Flammability:	UL 94 V-0	
Mounting:	DIN rail TS 35	
Protection:	IP 20	
Weight:	approx. 180 g	
Electrical connection:	6 plug-in terminal strips 4-pole	
Clamping range:	0,13...3,31 mm²	

9 Dimensions (in mm)



side view



top view